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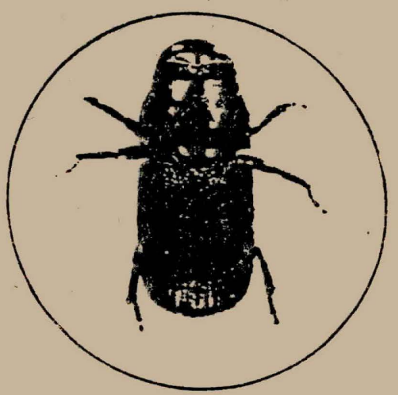
ACTION PLAN FOR LODGEPOLE PINE MANAGEMENT



Fremont National Forest

FREMONT NATIONAL FOREST

LODGEPOLE PINE MANAGEMENT ACTION PLAN

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Date: 7/25/86

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LODGEPOLE PINE MANAGEMENT ACTION PLAN

I. INTRODUCTION

A. Background

The lodgepole pine stands in south-central Oregon are experiencing an epidemic mountain pine beetle attack. Some tree mortality from beetle attack is common in this area, as mountain pine beetle outbreaks occurred in 1912, 1925, late 1940's, 1956, and the mid-1970's to the present. While there have been many outbreaks in the past, the current epidemic seems to involve a larger area than previous outbreaks on the Fremont National Forest (hereafter referred to as the Forest). In 1985, approximately 130,000 acres of the Forest were infested with mountain pine beetle. Because of the level of beetle activity and the high susceptibility of the existing lodgepole pine stands to the beetle, a specific lodgepole pine management program is urgently needed.

In the 1979 Fremont National Forest Timber Resource Plan (TRP), much of the lodgepole pine sawtimber was considered uneconomical because of its small size. The current programmed harvest is 20.7 MMBF annually from the standard, special and marginal lands. The TRP proposes a 50-year conversion of lodgepole pine in the Klamath Basin Working Circle, but schedules much less than twenty percent to be cut in the first decade. Without any catastrophic situations, a total of 207 MMBF $\pm$ 10 percent of lodgepole pine could be harvested per decade under the current plan. From 1979 through 1985, approximately 95 MMBF has been sold in lodgepole pine timber sales on the Fremont National Forest.

B. A Typical Mountain Pine Beetle Outbreak in a Lodgepole Pine Stand

Some populations of mountain pine beetle exist as discrete colonies in individual trees or small groups of trees scattered throughout the stand. These infested trees are generally of low vigor, having 20 growth rings or more per inch and producing less than 50 grams of wood per square meter of foliage per year. They are usually over 80 years old and larger than seven inches in diameter at breast height (dbh). As more trees in a stand advance into this state of decline, the beetle population begins to increase, the small groups of dead trees grow larger, and eventually the groups merge to create one large infestation center. The number of infested trees increase gradually from one tree per ten acres (endemic) to one tree or more per acre which then is classified as an epidemic outbreak.

In other areas with extensive stands of lodgepole pine, outbreaks have lasted from four to eighteen years with an average of about nine years. The majority of the mortality occurs between the third and sixth year (Table I). During severe outbreaks, the beetle populations can increase so rapidly that the former character of the stand is destroyed within a three-year period.

TABLE I--Simulated Mountain Pine Beetle Losses in a Lodgepole Pine Stand

Green Before Outbreak	OUTBREAK YEARS												Total Dead	Green After Outbreak
	1	2	3	4	5	6	7	8	9	10	11	12		
	----No. of trees killed per acre----													
378	3	9	28	50	41	25	8	3	2	1	1	1	171	208

The mountain pine beetle kills proportionately more large than small diameter trees. Beetles prefer the largest green trees left in a stand each year as the infestation/outbreak progresses. After the beetles have killed about 80 to 90 percent of the trees larger than seven inches dbh, they infest some of the remaining small diameter trees. So few beetles mature and emerge from these small trees that the population collapses, and the outbreak ends when less than one tree per acre is infested.

A summary of actual and projected beetle kill may be found in Appendix 2.

C. Purpose and Need for Action

The purpose of this action plan is to address the management of lodgepole pine timber on the Fremont National Forest in order to: (1) minimize the loss of live timber, and (2) salvage past and current mortality from mountain pine beetle infestation. Over 20 million board feet of timber were killed by the beetle in both 1983 and 1984 and over 14 million board feet in 1985. About 114,000 acres of mature and overmature lodgepole pine timber is in need of harvest to ultimately stem the epidemic. Entomologists predict that the present epidemic will run its course in lodgepole pine in 15 to 20 years. The magnitude of the timber land area, volume, and environmental impact from the infestation indicates several alternatives of harvest conversion are warranted.

This lodgepole pine management action plan (LPMP) is predicated on the Forest Timber Resource Plan . The LPMP sets forth accelerated harvest schedules within the allowable harvest of the current 10 year plan period of the TRP. The LPMP will be the action plan until approval of the forthcoming Forest Land and Resource Management Plan (Forest Plan), which is expected in November, 1987. Much of the information in this LPMP may be useful in developing the Forest Plan, although the alternatives developed in this LPMP will not preclude consideration of other options in that plan. Upon approval of the Forest Plan, this LPMP may be continued, revised, or rescinded and replaced accordingly.

The LPMP will be implemented to the extent funding is available. The Forest will program and budget for the lodgepole pine harvest in addition to its regular program which has a programmed annual harvest in the TRP of 15.9 million board feet of green lodgepole pine in the Klamath Basin Working Circle (KBWC). The LPMP provides for increasing the annual offerings of lodgepole pine sales in the KBWC by 20.0 million board feet. See Table V and Appendices 8 and 9. Table V shows a five year schdule of volume to be harvested. Appendices 8 and 9 show that the increased offering is within the programmed harvest volume for the plan period of the TRP.

D. Objectives

The objectives for the lodgepole pine management action plan are:

1. Reduce the susceptibility of lodgepole pine stands to mountain pine beetle attack, by both regeneration and intermediate cultural activities.

2. Provide a sufficient amount of lodgepole pine (both dead and green) for both personal and commercial fuelwood use.

3. Improve or maintain wildlife habitat capability - dead tree habitat, old growth replacement and riparian.

4. Salvage dead timber, and regenerate stands with a high incidence of dead lodgepole pine.

5. Create age-class diversity within the dead stands.

6. Use the most cost-effective treatments and apply them to the highest timber-producing sites first.

7. Enter stands which have greatest potential for regeneration (natural or artificial) first.

E. Responsible Official

The Forest Supervisor of the Fremont National Forest is the Responsible Official for developing and implementing an appropriate program and plan of management in stands containing a major lodgepole pine component.

II. ENVIRONMENTAL SETTING

A. Location - Topography

The Fremont National Forest is located in south-central Oregon within the Basin and Range Physiographic Province. The Basin and Range Province is characterized by northwest-trending fault block mountains and basins of internal drainage, interspersed with conical or irregularly-shaped volcanic piles. Most of this area lies at an elevation of more than 4,000 feet above sea level.

For the most part, the lodgepole pine timber stands occur at all exposures on gently sloping basins and tablelands. Most of the stands are found below about 7000 feet in elevation. The majority of the currently-infested timber is on the northwest portion of the Forest, where pumice soils are common.

B. Vegetation

The Fremont National Forest has approximately 130,000 acres of lodgepole pine (Table II). The lodgepole pine forest vegetation is a diverse composite of both pure and mixed stands of lodgepole pine. The distribution of this type is influenced greatly by topography, soils and climate related to these factors.

Lodgepole pine is the dominant species in nineteen separately defined plant communities or ecoclasses (see Appendix 3). Small amounts (0-20%) of white fir and ponderosa pine occur as scattered mature individuals or saplings and seedlings. Lodgepole pine is the climax vegetation in thirteen of these ecoclasses. Lodgepole pine is successional to ponderosa pine and true fir depending on topographic and edaphic features of the site.

All ranger districts on the Fremont National Forest have a significant number of lodgepole pine stands, except for the Lakeview Ranger District.

Only three mixed-conifer plant communities have a significant component of lodgepole pine. Mountain pine beetle is attacking these stands and may have its greatest impact on species other than lodgepole pine under these conditions. Ponderosa pine, western white pine, and sugar pine have all been lost during the epidemic. Immature sawlog-size individuals seem to be most favored by the beetle; however, mature ponderosa pine are occasionally attacked, causing mortality.

TABLE II

Approximate Acres of Lodgepole Pine*

Allocation	Overmature/ Mature	Saplings/ Seedlings	Total
Timber Production	77,000	16,000	93,000
Old-growth/SMU	22,000	NA	22,000
Hannan Trail	15,000	NA	15,000
	114,000	16,000	130,000

* capable of producing at least 20 cubic feet per acre per year

A majority (88 percent) of the lodgepole pine is in the mature/overmature stage (Table III). These stands are characterized by high overstory tree densities; low numbers or no trees in the understory; canopy closure; relatively low levels of shrubs, forbs, grasses, and other vegetation in the ground layer; and an abundance of dead or partially dead trees standing and on the ground.

TABLE III

Major Lodgepole Pine Successional Stages
on the Fremont National Forest

SUCCESSIONAL STAGE	ACRES	(%)	COMMENTS
Mature/Overmature	106,000	(82)	$\geq$ 20 ft^3/ac/yr
Mature/Overmature	8,000	(6)	SSC $\leq$ 20 ft^3/ac/yr 1/
Seedlings/Saplings	14,900	(11)	Young plantations $\geq$ 2-15 yrs
Seedlings	1,100	(1)	Plantations $\leq$ 2 years of age

1/ Scc means separate suitability component.

C. Wildlife

The mature and overmature lodgepole pine stands are being attacked by epidemic numbers of mountain pine beetle. Forest Service entomologists predict all mature/overmature lodgepole stands will be killed or suffer heavy tree mortality within two decades.

Rapid conversion of the mature/overmature lodgepole pine plant communities to plantations could result in significant short-term effects, both positive and negative, to the following species/groups unless modified to meet their needs or requirements of law:

Mule Deer - Summer Range: Nearly all the lodgepole pine occurs on mule deer summer range. Harvesting large acreages of mature/overmature lodgepole pine can create an abundant high quality food source. However, the cover needed by deer to use this food source can be eliminated.

Depending on the selected site preparation activities, a change in the shrub component (food and cover) can be expected.

Threatened and Endangered (T&E) Species: The bald eagle (threatened) and peregrine falcon (endangered) are two nationally recognized T&E species that use the Forest. Neither are directly dependent on lodgepole pine ecosystems. Bald eagles feed heavily on waterfowl, fish, and deer carrion; peregrines feed heavily on other birds. However, treatment of lodgepole pine could affect these species through possible reduction in water quality (therefore, fish habitat/numbers) and deer habitat (therefore, deer numbers), and through changing the types and abundance of birds. Increased roading, harvesting, and administrative use would also decrease solitude for these T & E species.

Dead Trees: Dead trees are an abundant and continuous habitat component of lodgepole pine stands, especially mature/overmature stands, on which numerous species are dependent. Under natural conditions, including catastrophic events such as insect epidemics and wildfire, an abundance of dead trees remain on site. Conversely, under managed conditions, dead trees, especially standing ones, may be in short supply until the regenerated stands provide replacements.

Old Growth Ecosystems: There are 323 native species of wildlife on the Forest and 223 (69 percent) use lodgepole pine habitats. At least 67 species are heavily dependent on lodgepole pine, and as many as 142 use lodgepole during their life cycles. At least 23 species require or are heavily dependent on mature/overmature lodgepole pine stands (Table IV). The northern three-toed woodpecker requires mature/overmature lodgepole pine; great grey owls and pine marten are typical species heavily dependent on this successional stage.

TABLE IV

Wildlife Dependence on Major Habitat Types
Provided by Lodgepole Pine Ecosystems
on the Fremont National Forest

HABITAT/COMPONENT	NUMBER OF SPECIES REQUIRED	HEAVY DEPENDENCE	OFTEN USED
Wet/Moist Lodgepole:			
--Early succession	0	34	142
--Mature/overmature	0	22	124
Dry Lodgepole:			
--Early succession	0	67	124
--Sapling	0	1	105
--Mature/overmature	1	13	107

Currently, thirty-seven lodgepole pine old growth clusters are identified for retention (about 7,200 acres). The stands were originally located to provide intra- and inter-Forest (USFS) linkage. Many of these are subject to mountain pine beetle attacks. A majority of these stands may not survive the beetles. Conversely, conversion of mature/overmature stands will also reduce the habitat available for dependent species.

Aquatic/Riparian Habitat: A majority of the habitat diversity within lodgepole pine communities is provided by aquatic/riparian ecosystems, which are scarce:

-Moist lodgepole - 3,000 acres
-Wet lodgepole - 3,200 acres
-Riparian lodgepole (streams) - 1,700 acres
-Riparian lodgepole (lakes, ponds, marshes, etc.) - unknown

The stream systems in lodgepole pine areas are primarily intermittent. Rapid liquidation of overmature stands will increase runoff (reduced snow interception/evaporation) and raise water tables (transpiration effect of trees reduced). The capacities of pumice drainage basin to absorb increased runoff is generally high. However, damage to stream channels and their associated riparian habitat from accelerated runoff (both timing and volumes) is probable. Overland and downstream transport of soil will result in the accelerated filling of water bodies and wetlands.

Riparian areas recieve the greatest amount of use by all wildlife species. For example, they are the fawn-rearing habitats for deer, primary nesting areas for great grey owls, and watering areas for most species found in lodgepole pine ecosystems.

Solitude: Solitude, or freedom from disturbance, is an important habitat component for some animals. Adverse effects on individuals or populations can result when animals are disturbed during nesting or rearing of young or on winter ranges. An accelerated harvest program will require more roads, and introduce people into nearly all of the lodgepole pine ecosystems on the Forest. Solitude will be reduced from current levels.

D. Plant and Animal Diversity

Diversity within most lodgepole pine communities is limited due to the vast acreages of similiar age-classes. Past cutting practices, recently established plantations, and intermediate cultural operations have not significantly altered these conditions except in local instances.

Additional diversity is desirable for many reasons. The need for rejuvenated cover and additional, well-distributed forage areas are obvious.

The mountain pine beetle is actively changing many lodgepole pine stands, and diversity will increase in spite of any other activity. Successional changes are also taking place and will continue to do so.

Relative abundance of each wildlife species will change over time, depending on the stage of development within a particular area. Fluctuations will occur locally but there should not be significant changes in populations.

E. Fire and Fuels

The risk of catastrophic fires within the lodgepole pine component is increasing, and will continue to do so over the next few years as the accumulation and continuity of fuels increases as a direct result of the mountain pine beetle epidemic. As years go by, more and more lodgepole pine will blow down and create a deeper fuel bed.

F. Firewood

Firewood demands have increased dramatically over the last ten years as other sources of energy become more expensive. There have been over 3,000 permits for this relatively inexpensive energy source, which is equivalent to approximately 7,500,000 board feet.

G. Range

Livestock use of the Fremont National Forest has been important since the arrival of the first settlers in the area. The type of livestock use has shifted from predominantly sheep in the early years to primarily beef cattle at present. Currently, livestock production is the second most important industry in Lake County. It is less important in Klamath County.

Many local ranchers depend on publicly-owned range. Fremont National Forest range is important to ranchers because it provides high quality forage during the period that home pastures are growing or being harvested for hay. One of the goals of the Forest's grazing permit system is to provide stability to the local ranch operations.

The Fremont National Forest is divided into 73 grazing allotments which are used by 68 livestock owners (permittees). Some allotments have as many as three permittees grazing livestock on them; others have only one. Some permittees have more than one allotment. Most of the livestock permits are for less than 200 head.

Livestock use on the Forest begins as early as April 15 and may continue as late as November 30. However, most grazing occurs from June 1 to September 30 each year. Approximately 72,000 Animal Unit Months (AUM's) are offered yearly on the Forest.

Opportunities exist to use livestock as a tool in vegetation management. An example might include grazing conifer plantations to reduce herbaceous competition with tree seedlings.

H. Recreation

Most of the major developed recreation sites on the Fremont National Forest are not within lodgepole pine stands. However, three sites - Campbell Lake, Dead Horse Lake, and Corral Creek - are exclusively in the lodgepole pine type. A mountain pine beetle epidemic is presently underway in these areas. The northern portion of the Gearhart Wilderness is also forested with lodgepole pine, much of which is decadent and susceptible to insect attack. At least a portion of the area contains numerous dead and dying trees. Numerous hunter camps, used during deer season, are situated in lodgepole pine stands. Many of these sites already contain much dead timber.

I. Visual Resources

Extensive stands of pure lodgepole pine occur in the foreground along travel routes where the visual quality objective may be partial retention. Where lodgepole pine is mixed with other species, the objective may be either retention or partial retention.

Many large stands of lodgepole pine, and blocks of land in the northern portion of the forest, contain epidemic infestations. Visual objectives are becoming increasingly difficult to meet.

J. Cultural Resource

The lodgepole pine areas of the Forest have low numbers of cultural sites. Inventories in this timber type have shown most sites are adjacent to springs, drainages and scabrock flats.

K. Soils

Much of the lodgepole pine timber lands are located on the western and northern portions of the Forest which have soils derived from windblown Mazama ash and pumice. These soils are characterized by a light-yellow or brown color, and a distinct AC horizon of single-grain structure. Beneath the ash and pumice mantle is the buried residual soil. This soil is reddish-brown or brown in color, medium textured, and derived from interbedded basalts and tuffs.

Texture varies from loamy sand to gravelly coarse sand, and depth ranges up to six feet or more. Generally, the deeper and coarser materials occur adjacent to the Winema National Forest and north of Antelope Flat on the Silver Lake Ranger District.

Ash and pumice soils have high infiltration and percolation rates. Overland flow very seldom occurs unless water is concentrated by the drainage facilities for roads.

Moisture storage capacity is also high. However, in the very coarse textured pumice soil, this moisture is often unavailable to plant roots. These soil layers impede root growth because of low nutrient levels and because the coarse pumice acts as a physical barrier.

Compaction and puddling are not usually problems on these soils. However, due to the soils' lack of structure and cohesiveness, displacement may be a problem on steeper slopes. Frost heaving is a problem related to topography and to the naturally low thermal conductivity of pumice soils.

Soil fertility is low. Most of the available nutrients are near the surface in the A1 and AC soil layers. Generally, levels of nitrogen, phosphate, and sulfate are in short supply.

Relatively few acres of lodgepole pine occur on soils derived from basalt, rhyolite, and pyroclastic material.

L. Water

Average increase in water yield following the beetle epidemic, timber salvage, or other treatment could be greater than 15-20 percent. This increase can be attributed to reduction of evapotranspiration and interception loss. Snow accumulations will also be greater in all areas affected, regardless of the activity. Small openings will collect more snow and will retard snowmelt. Larger openings will advance snowmelt by up to three weeks. Any increases in water-yield should not produce a great difference in the highest monthly average water yield.

Any large-scale harvest of lodgepole pine should not increase peak discharges unless major site disturbance occurs.

M. Transportation

The Fremont National Forest has about 6,000 miles of road. The average road density is 3.5 miles of road per square mile of land. Some temporary road construction is required and accomplished under timber sale contracts each year. Approximately 110 miles of road are constructed annually. About 1,300 miles of road are maintained annually to repair ditchlines, clean culverts, blade road surfaces, and remove windthrown trees.

The Forest blocks, inactivates, or obliterates about 25 to 50 miles of roads annually to meet resource program needs and objectives. Several large unroaded areas within lodgepole pine areas may require the planning and construction of an entire transportation system, depending on the forthcoming Forest Plan.

N. Social and Economic Setting

History of Lodgepole Pine Harvest Activity and Marketing: Until the 1960's, the Fremont National Forest's lodgepole pine forest resource was virtually untouched. Incidental harvesting took place primarily for posts and poles. The impacts of these activities went unnoticed.

In the late 1960's, new developments in harvesting and milling technology were made, and there was increase in the demand for lumber and wood fiber in general. These factors, along with an impending beetle infestation and subsequent control measures, drastically increased logging activity throughout the lodgepole pine type.

Lodgepole pine harvesting began in earnest on the Silver Lake Ranger District about 1964-65 when the Bald Mountain area was harvested. The heaviest cutting, however, occurred from 1970 to 1976, when approximately 25,000 acres were treated for a harvest of 120 MMBF of timber. To date, approximately 33,700 acres have been treated on Silver Lake Ranger District using a variety of silvicultural systems, including 10-inch diameter limit cutting, clearcuts, and shelterwood and seed tree regeneration methods. Products were generally lumber, box material and chips. Silver Lake Ranger District has about 67,000 acres of lodgepole pine which are capable and available for commercial timber production.

Paisley Ranger District has treated approximately 19,300 acres for a variety of products. It has been difficult to market the lodgepole pine in the area due to the distance from the market place. Paisley has about 45,000 acres of lodgepole pine which are capable and available for commercial timber production.

Bly Ranger District has treated about 4000 out of 15,000 acres of its commercial lodgepole pine component. Clearcutting has been used almost exclusively, followed by planting lodgepole pine seedlings.

Therefore, a total of about 57,000 acres of the lodgepole pine type has been entered on the Fremont National Forest from 1960 to 1983. Other sales have been offered but have failed to sell due to market conditions . In 1983, a marketing specialist was added to the Area IV staff headquartered at Winema National Forest in Klamath Falls, Oregon. There have been advancements in technology and marketing techniques for utilizing lodgepole pine, and the future for the resource looks promising. The predictions are that Area IV forests (the Deschutes, Fremont, Ochoco, and Winema National Forests) will not be able to supply enough lodgepole pine for these markets in the future.

Social Factors: Few major social factors are associated with the lodgepole pine forests on the Fremont National Forests. These social factors which may influence management direction for the use of the resource include:

--The Klamath Tribe - effects on the deer population and traditional hunting areas.

--Demands of lodgepole pine for heating fuel.

--Recreation, especially mule deer hunters.

--Forest workers, including loggers and tree planters.

III. ALTERNATIVES CONSIDERED

A. Alternative Development Background

A listing of "Lodgepole Pine Management Perceptions" was drawn up to view the many facets related to the current beetle epidemic. A total of 56 perceptions were identified, and a problem analysis was conducted. The analysis resulted in six alternatives thought to be viable under present guidelines and regulations. These alternatives are discussed in Subsection C. The alternatives considered treatments, priorities, economics, susceptibility, productivity and marketability. Differences among alternatives generally involved a combination of the above factors.

Briefly, the six alternatives are:

1. Emphasize natural regeneration opportunities (seed tree and shelterwoods) in order to minimize reforestation costs.

2. Salvage only; no regeneration; no entry into green stands.

3. Assume less risk and higher costs than Alternative 1 by relying heavily on artificial regeneration, especially in those areas with no reliable seed source.

4. Utilize similar treatments to those in Alternative 3, but do so on the best sites with the greatest combined benefit to all resources.

5. Combine treatment opportunities, including natural regeneration and clearcutting, as appropriate. Very little salvage work.

6. Continue with current harvest program.

B. Assumptions/Factors Common to all Alternatives

1. Within 20 years, all lodgepole pine will be attacked by mountain pine beetle, so anticipated conversion period is 20 years. Opportunities to naturally-regenerate the stands will decrease significantly within ten years, due to lack of reliable seed sources, so quick treatment is necessary.

2. Stands with productivity greater than 20 cubic feet per acre per year will be entered first, and highly-productive land will be regenerated first. Stands producing less than 20 cubic feet per year will not be agressively managed until it is decided by the Forest Plan.

3. Silvicultural treatments will include a combination of clearcut, shelterwood, overstory removal, and commercial thinning (beetle-proofing). At least some acreage will be salvaged.

4. Of the 114,000 acres of mature/overmature lodgepole pine stands (both lodgepole pine climax, and mixed-conifer with a significant component of lodgepole pine), only 77,000 acres will be scheduled for treatment in the five alternatives which propose changes from the current Timber Resource Plan. No active management will be planned for 37,000 acres of mature lodgepole pine (producing more than 20 cubic feet per acre per year) identified as having benefits which could not, or would not, be enhanced through a management regime. Acres to be treated reflect treating each acre once and do not reflect the need for final removal of shelterwood or seed trees, or regeneration of thinned stands.

5. There will be a need to use planting and natural regeneration in order to reduce reforestation costs, address a variety of markets (live and dead), and get acres back into production. The timing and planting of areas that are below minimum stocking at time of final harvest will be dependent on availability of seedlings. When seed and/or seedlings are not available immediately after harvest, additional site preparation may need to be done just prior to planting.

6. Lodgepole pine sales will likely be deficit, so costs should be minimized. Natural regeneration should be used where possible in order to minimize costs. A discussion of natural regeneration opportunities may be found in Appendix 4.

7. Fire hazard will be increased, but will be within acceptable limits in the lodgepole pine type. Fuels will be treated to Fremont National Forest fuel appraisal standards in all alternatives.

8. Personal-use firewood demands will be met.

9. Many resources will be addressed on a project-specific basis so that minimum management requirements are met or exceeded. This includes vegetative diversity in time and space, minimizing adverse impacts to soils, and minimizing conflicts between grazing and reforestation. Mule deer habitat would not decrease below 25 percent cover/75 percent forage, and an attempt will be made to create a 40/60 forage cover ratio, especially in fawning areas. Visual quality objectives of Retention and Partial Retention may be reduced to Modification in the short-term, but visual quality objectives will be met in the long-term (15 years).

C. Alternatives

Alternative 1

Relies heavily on natural regeneration methods, without clearcutting, to be treated within next 10 years. Salvage operations are a significant portion of treatment. Treats the "frontier"* with regeneration cutting. Treats 3850 acres annually.

Treatment		Acres
Natural regen (frontier)	=	10000
Natural regen (endemic)	=	25000
Commercial thin	=	10000
Salvage	=	32000
No active management	=	37000

*Area without a significant beetle population where beetle-proofing would be effective.

Alternative 2

Salvages dead lodgepole pine from a variety of stands. Includes some areas allocated to "No Active Management" in other alternatives. Unit size is to be maximized. May require longer than 20 years to complete the treatment, but most would be done in 10 years. No natural regeneration purposely sought. Acreage to be treated is undetermined at this time, since salvage would be dependent on the progression of the infestation.

Alternative 3

Clearcutting and planting would be the major activity in stands with greater than 50% dead and/or without a viable seed source. Completes most of this activity in ten years. Units may exceed 40 acres on some clearcuts and would be larger on shelterwood and commercial thinnings. A moderate amount of salvage would occur. Beetle-proofing would be limited to areas threatened with moderate beetle intensity.

Treatment		Acres
Clearcut and plant	=	30000
Natural regen (frontier)	=	10000
Natural regen (endemic)	=	-0-
Commercial thin	=	10000
Salvage	=	27000
No Active Management	=	37000

Alternative 4

Utilizes a variety of silvicultural treatments to the same degree as in Alternative 3, but does so on best sites and would result in the greatest combined benefit to all resource values. Requires a more in-depth analysis and coordinating effort for priority treatment areas.

Treatment		Acres
Clearcut and plant	=	30000
Natural regen (frontier)	=	10000
Natural regen (endemic)	=	-0-
Commercial thin	=	10000
Salvage	=	27000
No active management	=	37000

Alternative 5

Combines artificial regeneration with natural regeneration, and reduces the amount of salvage to the lowest level of all alternatives. Clearcutting and planting accomplished on most areas within 10 years. Natural regeneration would be used wherever possible.

Treatment		Acres
Clearcut and plant	=	30000
Natural regen (frontier)	=	10000
Natural regen (endemic)	=	25000
Commercial thin	=	10000
Salvage	=	2000
No active management	=	37000

Alternative 6.

Follows the current Timber Resource Plan, which regulates lodgepole pine in 50 years. Uses a wide range of silvicultural treatments to accomplish the objectives. No change in the sale program.

Treatment		Acres
Clearcut and plant	=	62000
Natural regen	=	72000
Commercial thin	=	21000
Salvage	=	5000

IV. EVALUATION OF ALTERNATIVES

Alternative 1

This alternative consists of natural regeneration without any clearcutting. In some cases, seed trees may not be the best examples of a "good" seed source; therefore, risk of failure would be high. Timing of entry, in order to ensure there would be healthy, green trees left as seed trees, would be difficult to achieve. Salvage of dead (dying) lodgepole would be greatest outside of the purely salvage alternative. The amounts of both dead and green timber would be nearly as high as Alternative 3. There would be no change in commercial thinning.

Wildlife habitat capability would be affected to a similar extent as clearcutting alternatives but there would be greater opportunity for maintaining older/larger DBH stems over a larger area. Disturbance from site preparation would be somewhat less than what would be needed for artificial regeneration. Heavier grass cover would result in that the fewest number of acres could/would be broadcast burned. Alternative 1 has the potential for the greatest diversity of age classes due to the length of time which may required to completely stock a seed tree cut.

This alternative would have a benefit/cost ratio of 0.18, the second highest of all of the alternatives.

Alternative 2

Alternative 2, the "salvage" alternative, would do nothing to reduce the susceptibility of uninfested stands, since no green timber would be harvested. Regeneration of the stands entered would be incidental and unplanned. The quality and extent of stocking would be poor, and future growth and yields would be lower in many cases due to small, dense clumps. All stands would be entered without regard to site productivity.

Stand diversity would be changed slightly, dependent on how much dead material was removed and how active the mountain pine beetle remained. This alternative would have the highest benefit/cost ratio at 0.74. Costs of future intermediate treatments would be higher than if uniform stocking occured.

Alternative 3

Alternative 3 would utilize clearcutting to the same extent as Alternatives 4 and 5 but would not take advantage of natural regeneration opportunities except in frontier areas. More losses to the mountain pine beetle would in future years occur in areas where beetle populations are now at endemic levels. Salvage operations would do little to change susceptibility. Some natural regeneration would occur in salvaged stands but at a low level.

Wildlife habitat capability would be maintained. Diversity would not be quite as great as Alternative 1, but it would be more than the other alternatives.

Costs would be higher than than Alternatives 1 or 2, but there would be less risk involved in that artificial regeneration would be a more certain proposition. The benefit/cost ratio would be 0.11, due largely to the increase in artificial regeneration.

Alternative 4

No difference from Alternative 3 that can be evaluated.

Alternative 5

Alternative 5 differs from previously discussed alternatives in that less acres would be salvaged and more acres treated with regeneration cuts. Commercial thinning would take advantage of treating susceptible but younger stands, and provide for greater longevity and diversity. This alternative would provide the greatest opportunity for future stand management, and would best meet the needs for all resources in the long run. Greater future yields would be possible due to more intensive management regimes used. There would be less opportunity to provide access for personal use firewood due to least number of acres to be salvaged. However, dead lodgepole pine would be plentiful where acess exists.

Alternative 5 would have the lowest benefit/cost ratio of all the alternatives. This ratio would be 0.09.

Alternative 5 would have the greatest potential for soil and water degradation due to more site prepartion used. A greater amount of runoff would also occur due to more snow accumulation in openings. Slash accumulations would be less than Alternative 1 but greater than the other alternatives discussed.

Alternative 6

Alternative 6 would follow the current Timber Resource Plan direction. Harvest levels would remain static, and heavy reliance on artificial regeneration would occur. Alternative 6 would enter all lodgepole pine plant communities and stands without regard to productivity. Natural regeneration would be used to a great degree. Alternative 6 would not take into account the current beetle infestation and the dynamic situation of the lodgepole pine type. Proposed harvest levels and treatments would not be appropriate for these changed conditions, and would result in lower productivity and higher costs in the future. Losses to the mountain pine beetle would be greater because areas with greater susceptibility would not be treated in a timely matter. Some treatment objectives would not be obtained.

Diversity of age classes would be fairly low over the next five years, and moderate at the end of 20 years.

This alternative would have one of the lowest benefit/cost ratios at 0.10.

Details of the economic analysis of the alternatives may be found in Appendix 5, and estimates of stand diversity following harvest treatment may be found in Appendix 6.

V. PREFERRED ALTERNATIVE

A preferred alternative was selected using the objectives in Section I, Subsection D. The alternative which best met these objectives as well as other desirable attributes was Alternative 5. Alternative 1 would less satisfactorily meet the criteria than the others.

Alternative 5 would intensively treat the most acres and provide for the best mix of benefits, not the least of which is diversity. Diversity would be the best way to help avert any future, widespread mountain pine beetle attacks.

VI. ACTION PLAN

The Action Plan for a five year period is shown in Table V (following page). The plan is projected for five years only so as to (1) provide a start-up program, and (2) keep the plan period short enough to allow flexibility for revision pursuant to the forthcoming Forest Plan.

In order to accelerate the harvesting of lodgepole pine, additional manpower and money is needed. An additional $101,045 per year would be necessary, at a minimum, to increase the annual harvest of lodgepole pine by 20,000 mbf. A minimum of 895 additional person-days (3.43 Full Time Equivalents, or FTE's) would be necessary to accomplish the work. A detailed breakdown of estimated budget and person-days may be found in Appendix 7.

Analyses of the lodgepole pine situation, in relation to the Timber Resource Plan (TRP), may be found in Appendices 8 and 9. Appendix 8 discusses the Klamath Basin Working Circle, and Appendix 9 discusses the Lakeview Federal Sustained Yield Unit.

Environmental analyses will be conducted for each project resulting from this plan.

TABLE V

LODGEPOLE PINE HARVEST
FIVE YEAR ACTION PLAN
KLAMATH BASIN SCHEDULE ONLY

Fiscal Year	Forest Totals	Silver Lake Ranger District				Paisley Ranger District				Bly Ranger District			
		Totals	New Plan	Add'l	TRP-79	Totals	New Plan	Add'l	TRP-79	Totals	New Plan	Add'l	TRP-79
86	35.9	23.4	-	15.0	8.4	8.2	-	3.0	5.2	4.3	-	2.0	2.3
	Volume could be dead or green - all regulated or chargeable												
87	35.9	23.4	-	15.0	8.4	8.2	-	3.0	5.2	4.3	-	2.0	2.3
	Volume could be dead or green - all regulated or chargeable												
88	35.9												
???? of TRP-79 or		(23.4)	-	(15.0)	(8.4)	8.2	-	3.0	5.2	4.3	-	2.0	2.3
???? of New Plan:													
-Chargeable (green)		10.0	10.0	-	-	5.0	-	-	-	2.0	-	-	-
-Non-Chargeable (dead)		13.4	4.5	8.9	-	3.2	2.1	1.1	-	2.3	0.9	1.4	-
89	35.9												
???? of TRP-79 or		(23.4)	-	(15.0)	(8.4)	8.2	-	3.0	5.2	4.3	-	2.0	2.3
???? of New Plan:													
-Chargeable (green)		10.0	10.0	-	-	5.0	-	-	-	2.0	-	-	-
-Non-Chargeable (dead)		13.4	4.5	8.9	-	3.2	2.1	1.1	-	2.3	0.9	1.4	-
90	35.9												
???? of TRP-79 or		(23.4)	-	(15.0)	(8.4)	8.2	-	3.0	5.2	4.3	-	2.0	2.3
???? of New Plan:													
-Chargeable (green)		10.0	10.0	-	-	5.0	-	-	-	2.0	-	-	-
-Non-Chargeable (dead)		13.4	4.5	8.9	-	3.2	2.1	1.1	-	2.3	0.9	1.4	-
Federal Sustained Yield Unit Chargeable (green)		-	-	-	-	-	1.5	-	3.9	-	-	-	-
Estimated Overmature Component by District			59%				29%				12%		

VII.

APPENDICES

Appendix 1

LIST OF PREPARERS

This analysis was conducted as an interdisciplinary effort by the following individuals on the Fremont National Forest:

Lee Bowers - Timber Management Assistant	Silver Lake R.D.
Jim Dawson - Range Specialist	Supervisor's Office
Jay Dunbar - Silviculturist	Silver Lake R.D.
Roger Lembrick - Sale Planner	Silver Lake R.D.
Mike Lohrey - Hydrologist	Supervisor's Office
Rick Nelson - Transportation Planner	Supervisor's Office
Cleon Puetz - Timber Planner	Supervisor's Office
Gene Silovsky - Wildlife Biologist	Supervisor's Office
Dave Wenzel - Soil Scientist	Supervisor's Office
Buck Woodward - Recreation & Lands Staff	Supervisor's Office
Ted Yarosh - Timber Management Officer	Supervisor's Office

The document preparation was assisted by others with expertise in a variety of disciplines. These people included:

Ed Blaydon - Area IV Marketing Specialist
Al Burkhardt - Regional Office
Bob Dolph - Regional Entomologist
Jerry Hoffer - Timber Planner, Winema National Forest
Tony Smith - Timber Planner, Deschutes National Forest
Tech. Advisory Group for Wildlife Management.

Appendix 2

SUMMARY OF ACTUAL AND PROJECTED BEETLE KILL

The following data are from Annual Aerial Insect Surveys. Information beyond 1985 was projected using simulated kill percentages.

YEAR	#INFESTATION CTRS	ACRES 1/	NO. TREES	BD. FT. VOLUME
1980	8	46,140	123,155	8,620,850
1981	52	49,600	120,116	8,408,120
1982	105	46,510	134,404	9,408,280
1983	157	73,860	310,723	21,750,610
1984	167	76,960	302,088	21,146,160
1985	228	130,830	267,673	14,312,000
1989 2/	192	88,504	347,000	24,000,000
1994	220	102,000	400,000	28,000,000
1999	254	117,000	459,000	32,000,000
2004	292	130,000	530,000	37,000,000
2009	292	13,000	530,000	37,000,000

1/ Excludes recently treated, but includes all other lodgepole pine infested.

2/ Acres infested will be less due to scattered nature of stands.

Appendix 3

LODGEPOLE PINE PLANT COMMUNITIES
ON THE FREMONT NATIONAL FOREST

PLANT COMMUNITY CODE	DESCRIPTION
CL-C1-11	White Bark Pine - Gay Penstemon
CL-C1-12	White Bark Pine/Western White Pine - Sandwort
CL-G3-11	Needlegrass Basins
CL-G3-13	Needlegrass/Lupine - Linanthastrum
CL-G3-14	Needlegrass/Lupine
CL-G3-15	Strawberry/Fescue
CL-G4-13	Sedge/Needlegrass Basins
CL-G4-15	Squirreltail/Long-stolen Sedge
CL-H1-11	Quaking Aspen - Strawberry
CL-M1-11	Sedge - Grass Wetland
CL-M2-11	Blueberry
CL-M3-11	Blueberry/Forb
CL-S2-11	Bitterbrush/Needlegrass
CL-S2-13	Bitterbrush/Forb
CL-S2-14	Bitterbrush/Fescue
CL-S2-15	Currant - Bitterbrush/Needlegrass
CL-S3-11	Manzanita
CL-S4-12	Grouse Huckleberry
CL-S9-11	Snowbrush - Manzanita

* Lodgepole pine is the dominant tree species in all these communities.

Appendix 4

NATURAL REGENERATION OPPORTUNITIES

Natural regeneration opportunities exist in most plant communities, provided the proper site/stand conditions exist. Table 1 indicates the opportunities for natural regeneration on the Fremont, within 10 years of harvest. Table 2 indicates the 20 year lag time. Natural regeneration is, of course, not as viable in stands which have been attacked by the mountain pine beetle. Clearcutting will be needed in situations where attacks have been heaviest. It is anticipated, however, that minor amounts of natural regeneration will occur.

Some conditions influencing natural regeneration success are:

- Topoedaphic variations are important rather than simply the topographic variations which can be responsible for natural regeneration success or failure.

- CL-M2-11 and CL-M3-11 are plant communities subject to rapid invasion of competing vegetation as well as high water tables which may also preclude the use of certain site prep techniques. Broadcast burning is possible if some of seed source can be saved. Blowdown potential is high.

- CL-S2-11 on the upper 2/3 slope on slopes >5% provide good candidates for natural regeneration. Better success can be expected if ponderosa pine is associated with the stand. Aspect may also be important.

- Pumice soils with a shallow AC horizon may be rendered extremely difficult to regenerate with either artificial or natural regeneration due to "over-exposure", including cold air, and poor soil/water relationships.

The referenced tables may be found on the following pages.

TABLE 1. Acres where natural regeneration within 10 years after seedtree/shelterwood entry is possible 80 percent of the time.

Plant Assoc.	Cubic Foot Productivity	Nat. Regen Potential	% of acreage to consider for Nat. Regen	Reasons for Modifying Rx
CL-G3-15	54	Variable	1/2	Have some experience with this and some success. High gopher population.
CL-G4-15	29	Difficult	1/3	High gopher pop. and subsequent damage.
CL-G3-11	20	Very difficult	0	Often incidental to "low key management" (salvage cutting)
CL-S2-11	35	Variable	1/3	Slope needed PIPO presence indicates this.
CL-S2-14	43	Difficult	1/3	High fescue competition and rapid invasion.
CL-S2-15	33	Variable	1/2	Some slope needed to be successful.
CL-S9-11	38	Variable	1/2	HGS, or heavy HSH, needed (Have experience with this plant community).
CL-G3-14	35	Difficult	0	Many times open grown on poor sites with little air drainage.
CL-G3-13	43	Difficult	1/2	Very cold; need slope for success. Heavy HSH leave.
CL-S3-11	14	Very difficult to none	0	Caution-no entry.
CL-S4-12	46	Very difficult	1/3	Swampy - site prep difficult; blowdown potential high.

Plant Assoc.	Cubic Foot Productivity	Nat. Regen Potential	% of acreage to consider for Nat. Regen	Reasons for Modifying Rx
	W E T T Y P E S			
CL-M1-11	66	Difficult	1/4	Difficult site prep; rapid invasion of herbaceous growth.
CL-M3-11	54	Difficult	1/4	Heavy HSH; blowdown potential high. High water table, compaction.
CL-M2-11	42	Easy	Majority of acreage	Leave slash cover for site preparation.
CL-S2-13	34	Easy	Majority of acreage	Easier than CL-M2-11. Broadcast burning good site prep.

TABLE 2. Acres where natural regeneration within 20 years after seedtree/shelterwood harvest is possible fifty percent of the time.

Plant Assoc.	Cubic Foot Productivity	Nat. Regen Potential	% of acreage to consider for Nat. Regen	Reasons for Modifying Rx
CL-S2-11	35	Variable	1/2	Dependent on aspect and air drainage. Leave slash cover.
CL-G4-12	29	Difficult	1/2	

Appendix 5

ECONOMIC ANALYSIS OF ALTERNATIVES

The purpose of this analysis was to determine the Net Present Worth (NPW) and benefit/cost ratio (B/C) for the six alternatives described in the text of this document. The analysis compared the cost of sale preparation, sale administration, reforestation, and other post-sale activities, to the value of the receipts from each alternative. Costs were derived from past experience and converted to a cost per acre. Benefits were derived by assuming all sales would appraise below cost and be advertised at minimum rates. For the purpose of this analysis, no KV dollars were assumed to be collected. Other assumptions used in this analysis were:

1. Time frame of analysis	20 years
2. Interest rate	4 %
3. Sale preparation (includes stand exams, environmental analysis, sale design, layout, mark, cruise, and sale packet preparation)	0-1 year
4. Harvest time (includes removal of timber and sale administration)	2-3 years
5. Post-sale time (includes site preparation reforestation, and stocking surveys)	4-8 years
6. Benefits start in year 3.	

Benefits for this analysis were determined by assuming that a typical lodgepole pine stand on the Fremont National Forest contains approximately 5 mbf/acre, and that the value of that product is $5/mbf, or $25/acre.

Estimated costs for various activities were as follows:

1. Stand exams	$4.25 / acre
2. EA and Sale Design	$4.00 / acre
3. Layout	$4.00 / acre
4. Marking	$3.00 / acre
5. Cruising	$3.50 / acre
6. Sale package preparation	$4.50 / acre
7. Sale administration	$2.50 / acre
8. Artificial reforestation	$325 / acre
9. Site preparation	$100 / acre
10. Stocking surveys	$11.70 / acre

For each alternative, the treatment period for each silvicultural method had to be estimated in order to arrive at assumed acreages treated per year. These estimates are listed below.

Alternative 1

Shelterwood (HSH)	- 10,000 acres first 10 years -	1000 acres/year
Shelterwood (HSH)	- 25,000 acres over 20 years -	1250 acres/year
Commercial Thin (HTH)	- 10,000 acres over 20 years -	500 acres/year
Salvage (HSV)	- 32,000 acres over 20 years -	1600 acres/year
	Annual Treatment Acreage for first decade only -	4350 acres/year

Alternative 2

HSV	- 40,000 acres first 10 years -	4000 acres/year
HSV	- 20,000 acres second 10 years -	2000 acres/year
	Annual Treatment Acreage for first decade only -	4000 acres/year

Alternative 3

HSH	- 10,000 acres first 10 years -	1000 acres/year
Clearcut (HCC)	- 30,000 acres first 10 years -	3000 acres/year
HSH	- 10,000 acres over 20 years -	500 acres/year
HSV	- 27,000 acres over 20 years -	1350 acres/year
	Annual Treatment Acreage for first decade only -	5850 acres/year

Alternative 4

Same as Alternative 3

Alternative 5

HCC	- 30,000 acres first 10 years -	3000 acres/year
HSH	- 35,000 acres over 20 years -	1750 acres/year
HTH	- 10,000 acres over 20 years -	500 acres/year
HSV	- 2,000 acres over 20 years -	100 acres/year
	Annual Treatment Acreage for first decade only -	5350 acres/year

Alternative 6

HSH	- 72,000 acres over 50 years -	1440 acres/year
HTH	- 21,000 acres over 50 years -	420 acres/year
HCC	- 62,000 acres over 50 years -	1240 acres/year
HSV	- 5,000 acres over 50 years -	100 acres/year
	Annual Treatment Acreage -	3200 acres/year

The following chart is a summary of the costs and benefits, by year, and the resulting NPW and B/C for each alternative. Other benefits to be realized are wildlife habitat enhancement, visual quality improvements, and recreational improvements; these benefits, while important, cannot easily be quantified.

ECONOMIC ANALYSES OF ALTERNATIVES

SUMMARY OF COSTS AND BENEFITS BY YEAR

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
Year	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit
0	35,888		33,000		48,260		48,260		44,138		26,400	
1	101,613		77,000		132,860		132,860		104,238		78,030	
2	101,613		77,000		132,860		132,860		104,238		78,030	
3	587,500	108,750	123,000	100,000	1,576,305	146,250	1,576,305	146,250	1,630,183	133,750	786,470	80,000
4	"	"	"	"	"	"	"	"	"	"	"	"
5	"	"	"	"	"	"	"	"	"	"	"	"
6	"	"	"	"	"	"	"	"	"	"	"	"
7	"	"	"	"	"	"	"	"	"	"	"	"
8	"	"	"	"	"	"	"	"	"	"	"	"
9	"	"	"	"	"	"	"	"	"	"	"	"
10	579,256	"	107,300	"	1,543,305	"	1,543,305	"	1,605,433	"	"	"
11	561,756	"	85,300	"	1,482,305	"	1,482,305	"	1,572,433	"	"	"
12	561,756	"	85,300	"	1,482,305	"	1,482,305	"	1,572,433	"	"	"
13	450,056	83,750	61,900	50,000	60,505	46,250	60,505	46,250	262,333	58,750	"	"
14	"	"	"	"	"	"	"	"	"	"	"	"
15	"	"	"	"	"	"	"	"	"	"	"	"
16	"	"	"	"	"	"	"	"	"	"	"	"
17	"	"	"	"	"	"	"	"	"	"	"	"
18	"	"	"	"	"	"	"	"	"	"	"	"
19	"	"	"	"	"	"	"	"	"	"	"	"
20	422,420	"	45,400	"	45,245	"	45,245	"	242,945	"	"	"

RESULTING NET PRESENT WORTHS AND BENEFIT COST RATIOS BY ALTERNATIVE

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Cost	-9,627,194	-1,804,600	-16,324,810	-16,324,810	-18,493,470	-14,338,920
Present Worth Cost	-6,474,805	-1,294,736	-12,224,933	-12,224,933	-13,469,473	-9,378,599
Total Benefit	1,757,500	1,400,000	1,832,500	1,832,500	1,807,500	1,440,000
Present Worth Benefit	1,167,704	960,161	1,291,219	1,291,219	1,250,047	936,339
NET PRESENT WORTH	-5,307,101	-334,575	-10,933,714	-10,933,714	-12,219,426	-8,442,261
BENEFIT/COST RATIO	0.18	0.74	0.11	0.11	0.09	0.10

Appendix 6

STAND DIVERSITY

Diversity in Year 5 of Harvest Schedule

Stand Age (in years)	Alternative 1		2		3		4		5		6	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
0-10	15,200	12	3,000	2	23,000	18	10,900	8	20,600	16	13,300	7
11-20	7,600	6	7,500	6	7,600	6	7,600	6	7,100	6	7,600	4
21-40	2,000	1	2,000	2	2,000	1	2,000	2	1,900	1	2,000	1
41-60	10,000	8	9,900	8	5,400	4	9,900	8	9,300	7	9,900	5
61-80	32,000	24	39,500	30	38,000	29	39,700	30	25,200	19	39,800	20
80+	63,200	49	68,100	52	54,000	42	59,900	46	65,900	51	125,400	63
Totals	130,000	100	130,000	100	130,000	100	130,000	100	130,000	100	198,000	100

Diversity in Year 20 of Harvest Schedule

Stand Age (in years)	Alternative 1		2		3		4		5		6	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
1-10	8,500	6	7,700	6	18,800	14	11,800	9	37,000	28	23,400	12
11-20	21,900	17	0	0	19,700	15	23,600	18	28,000	22	11,700	6
21-40	6,600	5	7,200	6	6,500	5	6,000	5	7,600	6	6,700	3
41-60	1,700	1	1,900	1	1,700	1	1,600	1	2,000	1	1,800	1
61-80	8,700	7	9,500	7	4,600	4	7,900	6	10,000	8	8,800	4
81+	82,600	64	103,700	80	78,700	61	79,100	61	45,400	35	145,600	74
Totals	130,000	100	130,000	100	130,000	100	130,000	100	130,000	100	198,000	100

Appendix 7

BUDGET AND PEOPLE (FTE'S) NECESSARY TO OFFER AN ADDITIONAL 20 MMBF OF LODGEPOLE PINE PER YEAR

This section addresses the money and people necessary to plan, prepare, offer, and administer an additional 20 MMBF of lodgepole pine for a fiscal year. The costs are based on data collected on previous sales. Assumptions used for this analysis are listed below, followed by the estimated costs and person-days necessary for each activity. A summary of the costs and FTE's concludes the section.

Assumptions

1. Due to the epidemic nature of the situation, planning and layout processes will be streamlined where possible.

2. Most of the sales either require purchaser selection of trees, or they involve area salvage.

3. Most sales are in either pure lodgepole pine stands, or predominantly lodgepole pine stands.

4. Most areas are already adequately roaded except for short temporary spurs. A few isolated areas may be the exceptions, so only about 5 miles of additional roading is required each year.

5. Wildlife leave areas need to be laid out.

6. Average volume is 5 mbf/acre. Therefore, approximately 4000 acres is treated each year.

7. The additional 20 mmbf are sold as three separate large sales on one District. Splitting the 20 mmbf into a number of smaller sales or among the Ranger Districts would increase the cost and man-days per unit of volume.

Costs - Planning	Cost	Person-days
1. Office recon (TRI, photos, etc.) 2 days @$105/day for 3 sales	$ 630	6
2. Field recon, about 640 acres/day. 3 days per sale, $105/day	945	9
3. Silvicultural prescription. 20 days of GS-9 for all 3 sales, @ $105/day	2100	20
4. Scoping/Establish ID Team 8 people, 1/2 day per sale, @ $125/day	1500	12

Costs - Planning - Cont.	Costs	Person-days
5. ID Team develop alternatives. 4 people, 1 day per sale @ $105/day	1260	12
6. ID Team evaluate alternatives. 4 people, 2 days per sale @ $105/day	2520	24
7. ID Team field review. 4 people, 1 day per sale @ $105/day	1260	12
8. Paperwork (prework, memos, EA's, etc.). 20 days/sale, @ $105/day	6300	60
Costs - Operations		
1. Layout, including wildlife leave areas. 100 acres per day, @ $105/day (all three sales lumped together)	4200	40
2. Cruise, probably just a pre-cruise. 6 people, totalling $450/day, cruising 200 acres/day (all three sales lumped together)	9000	120
3. Volume determination. 1 week GS-3 to input data @ $60/day & 1 week GS-9 for compilation @ $105/day (all three sales lumped together)	825	10
4. Appraisal and Contract. 10 days per sale, @ $105/day	3150	30
Costs - Engineering		
1. Survey (5 miles per year). 1/4 mile per day, 3 person crew, $200/day/crew	4000	60
2. Design and Contract. 5 days/sale, $105/day	1575	15
Costs - Administration		
1. Sale Administration. 1 sale administrator per every 15 mmbf @ $105/day	36,540	348

Costs - Support	Costs	Person-days
1. Vehicles.		
At least 2, more if cut is spread among the Districts. Using averages:		
2 rigs, 9000 miles/rig, $.19/mile	3420	N/A
2 rigs, 12 months/rig, $110/month (FOR)	2640	N/A
2. Supplies (staples, ribbon, etc.)		
$.10/mbf, 20,000 mbf	2000	N/A
3. Misc. vehicle damage repair.	1000	N/A
4. Per diem and Overtime.		
10 days @ $100/day	1000	N/A
$.10/mbf in overtime	2000	N/A

Costs - Summary	Total Cost	$/mbf	Person-days	FTE's
Planning	$ 16,515	$ ..82	155	0.59
Operations	17,175	.86	200	0.77
Engineering	5,575	.28	75	0.29
Sale Administration	36,540	1.83	348	1.33
Support	12,060	.60	N/A	N/A
Subtotals	$ 87,865	$4.39	778	2.98
Misc. Overhead (15% of subtotals)	13,180	.66	117	.45
TOTALS	$ 101,045	$5.05	895	3.43

Appendix 8

Fremont National Forest
Klamath Basin Working Circle

LODGEPOLE PINE (LP) SITUATION
Mt. Pine Beetle Epidemic
Salvage Possibility

Existing (1979) TM Plan Controls:

sell ± 30% chargeable lodgepole pine (LP) volume prior to triggered adjustments.

FY	79	80	81	82	83	84
LP Volume Sold/FY/MMBF	6.2	10.0	15.0	5.5	15.5	6.5

Planned average Annual Sell volume in LP = 15.8 MMBF

Total sold volume for the 6 years = 58.7 MMBF (9.8/yr)
Total Planned sell volume for 6 yrs. = 95.0 MMBF (15.8/yr)
- 38% Difference -36.3 MMBF less than planned

Part of the reason for the reduction below Planned has been the lack of market.

Forest could sell an additional 36.3 MMBF to even out the LP species planned sell volumes.
Additional 30% permitted to date (84) -28.5 MMBF
Additional 30% permitted over the remainder of the Plan Period 85-84 = 18.9 MMBF (From Adjusted Yield Table).

** Chargeable Standing Dead LP - 1980-1985 = (150) MMBF (From Adjusted Yield Table)
Available after Other Resources & Access constraints = 70 MMBF*
Standing dead LP volume is estimated to remain fiber-sound for between 6 & 10 years depending upon site.
Estimated average annual kill of 20 MMBF

Total available additional chargeable volume*

	36.3 MMBF makeup volume
	28.5 MMBF + 30% to date
	70.0 MMBF available dead chargeable volume
Total	134.8 MMBF

Approximately 50 MMBF/Yr. (includes 15.8/Yr. Annual Programmed Harvest) in comparison to 15.8 MMBF/Yr. could be sold in each of the next three years (start of New Plan Period).

** Merchantable dead lodgepole pine can be considered chargeable in the existing TM plan because of the epidemic beetle damage situation.

Actual LP timber sale harvest and fuelwood volumes in FY 85-86 were not considered in these calculations. Harvested LP mortality volumes will be considered non-chargeable in the Forest Plan because yield tables consider the planned epidemic consequences on green volumes.

Any additional timber sales sold because of the proposed LP salvage program would comply with NEPA. Special concerns are for soil, water, and wildlife considerations. Because of the epidemic situation, additional (not considered in these calculations) dead LP volumes could be sold over a shorter period of time to prevent losses.

Appendix 9

Fremont National Forest
Lakeview Federal Sustained-Yield Unit

LODGEPOLE PINE (LP) SITUATION
Mt. Pine Beetle Epidemic
Salvage Possibility

Existing (1979) TM Plan Controls:

sell ± 30% chargeable lodgepole pine (LP) volume prior to adjustment trigger.

FY	79	80	81	82	83	84
LP Volume Sold/FY/MMBF	0	3.3	2.0	0	7.5	2.0

Planned average Annual Sell volume in LP - 4.8 MMBF

Total Sold volume for the 6 yrs	14.8 MMBF (2.5 MMBF/Yr)
Total Planned to Sell for 6 yrs	28.8 MMBF (4.8 MMBF/Yr)
-49% Difference	*14.0 MMBF less than planned

The main reason for this reduction is the lack of market.
Could sell an additional 14.0 MM to even out the species planned sell volume.
Additional 30% permitted to date (84) - 8.6 MMBF*
Additional 30% permitted over the remainder of the Plan Period (85-89) = 5.8 MMBF (not used in this evaluation).

** Chargeable Standing Dead LP - 1980-1986 Est. (13) MMBF (From Ranger District data est.- Adj Yield Table).
Available after Other Resource & Access constraints considered = 8 MMBF
The standing dead LP volume is estimated to remain fiber-sound for between 6 & 10 yrs depending upon site.
Est. Average kill each year of = 1-2 MMBF (1.5 Av.)

Total available additional chargeable volume prior to implementation of the Forest Plan:

	14.0 MMBF makeup volume
	8.6 MMBF + 30% to 1984
	8.0 MMBF available dead chargeable volume
Total	30.6 MMBF

This could permit about three times the total annual sell volume of LP through the start of the New Forest Plan (1986-87). This would be about 15 MMBF/Yr (30.6 + 14.4 = - 3). The rate of salvage can be adjusted as needed from this base to consider markets, finances, etc.

** Merchantable dead lodgepole pine can be considered chargeable in the existing TM Plan because of the epidemic beetle damage situation.

Actual LP timber sale harvest and fuelwood volumes in FY 85-86 were not considered in these calculations. Harvested LP mortality volumes will be considered non-chargeable in the Forest Plan because yield tables consider the planned epidemic consequences on green volumes.

Any additional timber sales sold because of the proposed LP salvage program would comply with NEPA. Special concerns are for soil, water, wildlife, and Indian Treaty Rights. Because of the epidemic situation, additional (not considered in these calculations) dead LP volumes could be sold over a shorter period of time to prevent deterioration losses.

*30.6 MMBF (Makeup Vol + 30% to 1984 + Mortality to 1987)
14.4 MMBF (3 Yrs. of Programmed Harvest)
Total 45.0 MMBF